

# इंटरनेट

# मानक

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“Step Out From the Old to the New”

IS 1248-6 (2003): Direct Acting Indicating Analogue Electrical Measuring Instruments and their Accessories, Part 6: Ohmmeters (Impedance Meters) and Conductance Meters [ETD 12: Measuring Equipment for Basic Electrical Quantities]



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“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

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“Knowledge is such a treasure which cannot be stolen”



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भारतीय मानक

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भाग 6 ओममीटरों (इम्पीडेन्स मीटरों) और कन्डक्टैन्स मीटरों की विशेष अपेक्षाएँ  
( तीसरा पुनरीक्षण )

*Indian Standard*

DIRECT ACTING INDICATING ANALOGUE  
ELECTRICAL MEASURING INSTRUMENTS  
AND THEIR ACCESSORIES

PART 6 SPECIAL REQUIREMENTS FOR OHMMETERS (IMPEDANCE METERS)  
AND CONDUCTANCE METERS

*( Third Revision )*

ICS 17.220.20

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BUREAU OF INDIAN STANDARDS  
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NEW DELHI 110002

**AMENDMENT NO. 1 AUGUST 2007  
TO  
IS 1248 (PART 6) : 2003 DIRECT ACTING  
INDICATING ANALOGUE ELECTRICAL  
MEASURING INSTRUMENTS AND  
THEIR ACCESSORIES**

**PART 6 SPECIAL REQUIREMENTS FOR  
OHMMETERS (IMPEDANCE METERS) AND  
CONDUCTANCE METERS**

*( Third Revision )*

*(Page 2, clause 7.3) — Substitute '6.14' for '5.14'.*

## FOREWORD

This Indian Standard (Part 6) (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Measuring Equipment for Basic Electrical Quantities Sectional Committee had been approved by the Electrotechnical Division Council.

The standard covers the special requirements for ohmmeters (impedance meters) and conductance meters.

This standard was first published in 1958 and was revised in 1968 and 1983.

This standard is one of a series of nine Indian Standards on direct acting indicating analogue electrical measuring instruments and their accessories. Other parts are as follows:

- (Part 1) : 2003 Definitions and general requirements (*fourth revision*)
- (Part 2) : 2003 Special requirements for ammeters and voltmeters (*third revision*)
- (Part 3) : 2003 Special requirements for wattmeters and varmeters (*third revision*)
- (Part 4) : 2003 Special requirements for frequency meters (*third revision*)
- (Part 5) : 2003 Special requirements for phase meters, power factor meters and synchrosopes (*third revision*)
- (Part 7) : 2003 Special requirements for multi-function instruments (*third revision*)
- (Part 8) : 2003 Special requirements for accessories (*third revision*)
- (Part 9) : 2003 Test methods (*third revision*)

In preparation of this standard, assistance has been derived from IEC 60051-6 (1984) 'Direct acting indicating analogue electrical measuring instruments and their accessories: Part 6 Special requirements for ohmmeters (impedance meters) and conductance meters (fourth edition)', issued by the International Electrotechnical Commission (IEC).

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*

# DIRECT ACTING INDICATING ANALOGUE ELECTRICAL MEASURING INSTRUMENTS AND THEIR ACCESSORIES

## PART 6 SPECIAL REQUIREMENTS FOR OHMMETERS (IMPEDANCE METERS) AND CONDUCTANCE METERS

*( Third Revision )*

### 1 SCOPE

1.1 This standard (Part 6) covers ohmmeters (impedance meters) and conductance meters.

1.2 This part also applies to non-interchangeable accessories [as defined in 2.1.15.3 of IS 1248 (Part 1)] used with ohmmeters (impedance meters) and conductance meters.

1.3 This standard (Part 6) does not also apply resistivity meters (specific resistance meters), insulation resistance meters used in energized circuits or conductivity meters (specific conductance meters).

### 2 REFERENCES

The following standards are necessary adjuncts to this standard:

<i>IS No.</i>	<i>Title</i>
1248	Direct acting indicating analogue electrical measuring instruments and their accessories:
(Part 1) : 2003	Definitions and general requirements ( <i>fourth revision</i> )
(Part 9) : 2003	Test methods ( <i>third revision</i> )

### 3 DEFINITIONS

The provisions of 3 of IS 1248 (Part 1) shall apply.

### 4 DESCRIPTION, CLASSIFICATION AND COMPLIANCE

#### 4.1 Description

Ohmmeters shall be described.

4.1.1 According to their method of operation as given in 3.2 of IS 1248 (Part 1).

4.1.2 According to whether they measure resistance values by a two-terminal or a four-terminal method.

4.1.3 According to whether they have a linear scale or a non-linear scale.

#### 4.2 Classification

Ohmmeters shall be classified in one of the accuracy classes denoted by the following class indices:

0.05, 0.1, 0.2, 0.5, 1, 1.5, 2, 2.5, 3, 5, 10 and 20

#### 4.3 Compliance with the Requirements of this Standard

4.3.1 The provisions of 4.3.1 of IS 1248 (Part 1) shall apply.

4.3.2 The provisions of 4.3.2 of IS 1248 (Part 1) shall apply.

4.3.3 For impedance meters and for instruments not scaled in units of resistance or conductance, the manufacturer's instructions shall be followed.

### 5 REFERENCE CONDITIONS AND INTRINSIC ERRORS

#### 5.1 Reference Conditions

5.1.1 The provisions of 5.1.1 of IS 1248 (Part 1) shall apply.

5.1.2 The provisions of 5.1.2 of IS 1248 (Part 1) shall apply.

5.1.3 The provisions of 5.1.3 of IS 1248 (Part 1) shall apply.

5.1.4 The requirements of Table 1 of IS 1248 (Part 1) concerning ripple, distortion, peak-factor and frequency do not apply to ohmmeters.

#### 5.2 Limits of Intrinsic Error Fiducial Value

The provisions of 5.2 of IS 1248 (Part 1) shall apply.

##### 5.2.1 Correspondence Between Intrinsic Error and Accuracy Class

The provisions of 5.2.1 of IS 1248 (Part 1) shall apply.

##### 5.2.2 Fiducial Value

The fiducial value for an ohmmeter corresponds to.

**5.2.2.1** The indicated value for non-linear scale ohmmeters. The class index is marked using symbol E-3 given in Table 3 of IS 1248 (Part 1) [see 9 of IS 1248 (Part 1)].

**5.2.2.2** The span for linear scale ohmmeters. The class index is marked using Symbol E-10 given in Table 3 of IS 1248 (Part 1) [(see 9 of IS 1248 Part 1)].

### **5.3 Rated Values**

**5.3.1** When a rated voltage is stated, the open circuit voltage at the measuring terminals shall not differ from the rated voltage by more than 10 per cent of the rated voltage.

**5.3.2** When a rated voltage across a given value of test resistance is stated, the voltage shall not differ from the rated voltage by more than 10 per cent of the rated voltage.

**5.3.3** When a maximum (or a minimum) value is stated, it shall not exceed (or be less than) the stated voltage at any permissible supply voltage and at any setting of the controls and adjustments which are accessible to the user.

**5.3.4** When a rated maximum or minimum current is stated, the requirements of 5.3.1 to 5.3.3 shall apply, substituting current for voltage.

## **6 NOMINAL RANGE OF USE AND VARIATIONS**

### **6.1 Nominal Range of Use**

**6.1.1** The provisions of 6.1.1 of IS 1248 (Part 1) shall apply.

**6.1.2** The provisions of 6.1.2 of IS 1248 (Part 1) shall apply.

**6.1.3** The requirements of Table 2 of IS 1248 (Part 1) concerning ripple, distortion, peak-factor and frequency do not apply to ohmmeters.

### **6.2 Limits of Variations**

**6.2.1** The provisions of 6.2.1 of IS 1248 (Part 1) shall apply.

**6.2.2** The provisions of 6.2.2 of IS 1248 (Part 1) shall apply.

**6.2.3** The provisions of 6.2.3 of IS 1248 (Part 1) shall apply.

**6.2.4** The provisions of 6.2.4 of IS 1248 (Part 1) shall apply.

**6.2.5** Ohmmeters which employ batteries shall operate correctly with the batteries having any value of voltage and internal resistance within the ranges stated by the manufacturer. When the preliminary adjustments specified by the manufacturer have been carried out,

any variations caused by changes of the battery characteristics shall not cause the instrument to indicate outside its accuracy class.

### **6.3 Conditions for the Determination of Variations**

**6.3.1** The provisions of 6.3.1 of IS 1248 (Part 1) shall apply.

**6.3.2** The provisions of 6.3.2 of IS 1248 (Part 1) shall apply.

**6.3.3** The variations of ohmmeters intended for intermittent use shall be determined immediately after pre-conditioning, if any.

## **7 FURTHER ELECTRICAL AND MECHANICAL REQUIREMENTS**

### **7.1 Voltage Tests, Insulation Tests and Other Safety Requirements**

See IS 1248 (Part 1).

### **7.2 Damping**

The requirements of IS 1248 (Part 1) do not apply to ohmmeters.

### **7.3 Self-Heating**

For the recommended test, see 5.14 of IS 1248 (Part 9).

**7.3.1** The requirements of IS 1248 (Part 1) do not apply to ohmmeters.

**7.3.2** The requirements of IS 1248 (Part 1) do not apply to ohmmeters.

**7.3.3** The requirements of IS 1248 (Part 1) do not apply to ohmmeters.

**7.3.4** See IS 1248 (Part 1).

**7.3.5** Ohmmeters intended for continuous use shall comply with their accuracy requirements after being connected to an open circuit for any time after the completion of the specified pre-conditioning period, if any.

They shall similarly comply with their accuracy requirements after being connected to a short circuit.

**7.3.6** The requirements of 7.3.5 also apply to ohmmeters intended for intermittent use except that the time after connection shall be up to 30 s for ohmmeters having hand-driven rotary generators and up to 5 min for all other ohmmeters intended for intermittent use.

### **7.4 Permissible Overloads**

The requirements of IS 1248 (Part 1) do not apply to ohmmeters.



## 7.5 Limiting Values of Temperature

See IS 1248 (Part 1).

## 7.6 Deviation from Zero

There are no requirements relating to deviation from zero for ohmmeters.

## 8 CONSTRUCTION REQUIREMENTS

### 8.1 Sealing to Prevent Access

See IS 1248 (Part 1).

### 8.2 Scales

**8.2.1** The provisions of **8.2.1** of IS 1248 (Part 1) shall apply.

**8.2.2** The provisions of **8.2.2** of IS 1248 (Part 1) shall apply.

#### 8.2.3 Direction of Deflection

The direction of deflection for ohmmeters is not specified.

#### 8.2.4 Limits of the Measuring Range

**8.2.4.1** The provisions of **8.2.4.1** of IS 1248 (Part 1) shall apply.

**8.2.4.2** The provisions of **8.2.4.2** of IS 1248 (Part 1) shall apply.

**8.2.4.3** The provisions of **8.2.4.3** of IS 1248 (Part 1) shall apply.

**8.2.4.4** For ohmmeters with non-linear scales, the method of identifying the limits of the measuring range by the omission of sub-divisions outside the measuring range [(Fig. 1 of IS 1248 (Part 1))] shall not be used.

**8.2.4.5** The measuring range shall correspond to at least 50 per cent of the scale length.

### 8.3 Preferred Values

To be agreed between the manufacturer and the user.

### 8.4 Adjuster(s), Mechanical and/or Electrical

See IS 1248 (Part 1).

### 8.5 Effects of Vibration and Shock

See IS 1248 (Part 1).

## 9 INFORMATION, GENERAL MARKINGS AND SYMBOLS

### 9.1 Information

See IS 1248 (Part 1).

**9.1.1** The open-circuit voltage or the voltage across a test resistance of given value and the short circuit current are rated values and shall be stated as required by item (e) of **8.1** in IS 1248 (Part 1).

**9.2** The provisions of **9.2** of IS 1248 (Part 1) shall apply.

**9.3** The provisions of **9.3** of IS 1248 (Part 1) shall apply.

## 10 MARKINGS AND SYMBOLS FOR TERMINALS

**10.1** The provisions of **10.1** of IS 1248 (Part 1) shall apply.

**10.2** The provisions of **10.2** of IS 1248 (Part 1) shall apply.

**10.3** The provisions of **10.3** of IS 1248 (Part 1) shall apply.

### 10.4 Special Markings for Terminals

**10.4.1** Single-function two-terminal ohmmeters shall have the terminal which, when in use, is positive relative to the other terminal, marked with Symbol F-46 (+).

**10.4.2** Single function four-terminal ohmmeters shall have the current terminal which, when in use, is positive relative to the other current terminal, marked with Symbol F-46 (+).

**10.4.3** The requirements of **10.4.1** and **10.4.2** need not apply to multi-function instruments where other uses of the terminals may require different markings.

#### 10.4.4 Ohmmeters Having (an) Accessory(ies)

The terminals intended to be connected to an external measuring circuit shall be marked in accordance with **10.4.1** to **10.4.3**. The terminal(s) on the ohmmeter which is intended to be connected to a terminal(s) on the accessory(ies) shall be marked with an arabic numeral(s).

The manufacturer may select any convenient and non-conflicting numeral(s). Pairs of terminals which are intended to be connected together shall carry the same numeral.

## 11 TESTS TO PROVE COMPLIANCE WITH THIS STANDARD

See IS 1248 (Part 1) and Annex A.

**ANNEX A**

**(Clause 11)**

**TESTS**

**A-1 SUGGESTIONS FOR ROUTINE TESTS**

- a) Test for intrinsic error for resistance measurement (*see 5*).
- b) Test for rated, maximum or minimum voltage
- c) Test for variation due to position [(*see 6* and Table 2 of IS 1248 (Part 1))].
- d) Voltage test (*see 7.1*).

or current ( *see 5*).

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### Amendments Issued Since Publication

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